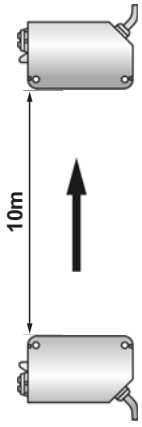
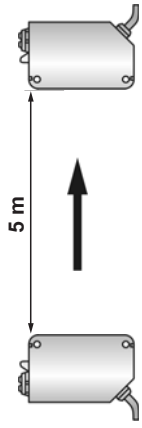
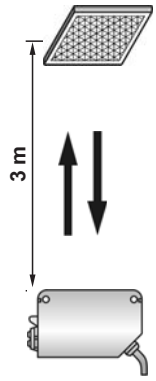
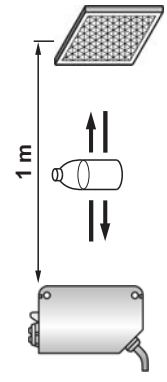
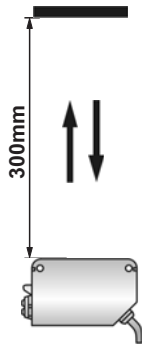
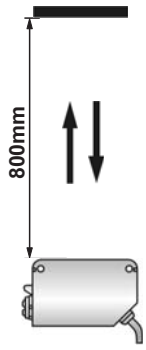
Standard Thru-beam Mode / Narrow Beam Thru-beam Mode

Sensing Mode	Connection	Supply Voltage	Output Mode	Part Number
 **Thru-beam Mode** Sensing Distance 10m Infrared LED	**2m Cable** 	10-30V DC	Emitter	RP31-T010MD-EY9C3L2
			NPN	RP31-T010MN-CY9C3U2
			PNP	RP31-T010MP-CY9C3U2
	Quick Disconnect (Pico-Style) 	10-30V DC	Emitter	RP31-T010MD-EY9Q4LP
			NPN	RP31-T010MN-CY9Q4UP
			PNP	RP31-T010MP-CY9Q4UP
	6" Pigtail (Pico-Style) 	10-30V DC	Emitter	RP31-T010MD-EY9P4LP
			NPN	RP31-T010MN-CY9P4UP
			PNP	RP31-T010MP-CY9P4UP
	6" Pigtail (Euro-Style) 	10-30V DC	Emitter	RP31-T010MD-EY9P4LE
			NPN	RP31-T010MN-CY9P4UE
			PNP	RP31-T010MP-CY9P4UE
 **Thru-beam Mode** (Narrow beam) Sensing Distance 5m Infrared LED	**2m Cable** 	10-30V DC	Emitter	RP31-T5000D-EY9C3L2-N
			NPN	RP31-T5000N-CY9C3U2-N
			PNP	RP31-T5000P-CY9C3U2-N
	Quick Disconnect (Pico-Style) 	10-30V DC	Emitter	RP31-T5000D-EY9Q4LP-N
			NPN	RP31-T5000N-CY9Q4UP-N
			PNP	RP31-T5000P-CY9Q4UP-N
	6" Pigtail (Pico-Style) 	10-30V DC	Emitter	RP31-T5000D-EY9P4LP-N
			NPN	RP31-T5000N-CY9P4UP-N
			PNP	RP31-T5000P-CY9P4UP-N
	6" Pigtail (Euro-Style) 	10-30V DC	Emitter	RP31-T5000D-EY9P4LE-N
			NPN	RP31-T5000N-CY9P4UE-N
			PNP	RP31-T5000P-CY9P4UE-N

Polarized Retroreflective Mode / Clear Object Detector

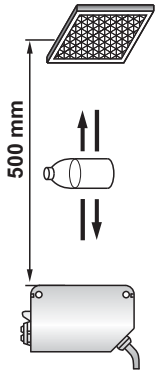
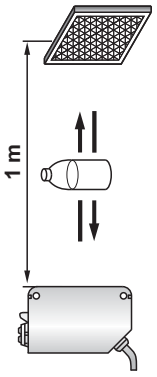
Sensing Mode	Connection	Supply Voltage	Output Mode	Part Number
 **Retroreflective Mode** (with polarizing filter) **Sensing Distance 0.1 to 3 m** (Note) **Red LED**	**2m Cable** 	**10-30V DC**	**NPN**	RP31-L3000N-CY6C3U2-PF
			PNP	RP31-L3000P-CY6C3U2-PF
	Quick Disconnect (Pico-Style) 	**10-30V DC**	**NPN**	RP31-L3000N-CY6Q4UP-PF
			PNP	RP31-L3000P-CY6Q4UP-PF
	6" Pigtail (Pico-Style) 	**10-30V DC**	**NPN**	RP31-L3000N-CY6P4UP-PF
			PNP	RP31-L3000P-CY6P4UP-PF
	6" Pigtail (Euro-Style) 	**10-30V DC**	**NPN**	RP31-L3000N-CY6P4UE-PF
			PNP	RP31-L3000P-CY6P4UE-PF
 **Clear Object Detector** **Sensing Distance 50 to 1000mm** (Note) **Red LED**	**2m Cable** 	**10-30V DC**	**NPN**	~~RP31-S1000N-CY6C3U2~~
			PNP	RP31-S1000P-CY6C3U2
	Quick Disconnect (Pico-Style) 	**10-30V DC**	**NPN**	~~RP31-S1000N-CY6Q4UP~~
			PNP	RP31-S1000P-CY6Q4UP
	6" Pigtail (Pico-Style) 	**10-30V DC**	**NPN**	~~RP31-S1000N-CY6P4UP~~
			PNP	RP31-S1000P-CY6P4UP
	6" Pigtail (Euro-Style) 	**10-30V DC**	**NPN**	~~RP31-S1000N-CY6P4UE~~
			PNP	RP31-S1000P-CY6P4UE

Standard Diffuse Mode / Long Range Diffuse Mode

Sensing Mode	Connection	Supply Voltage	Output Mode	Part Number
 **Diffuse Mode** (Standard) **Sensing Distance 300mm** **Infrared LED**	**2m Cable** 	**10-30V DC**	**NPN**	RP31-D0300N-CY9C3U2
			PNP	RP31-D0300P-CY9C3U2
	Quick Disconnect (Pico-Style) 	**10-30V DC**	**NPN**	RP31-D0300N-CY9Q4UP
			PNP	RP31-D0300P-CY9Q4UP
	6" Pigtail (Pico-Style) 	**10-30V DC**	**NPN**	RP31-D0300N-CY9P4UP
			PNP	RP31-D0300P-CY9P4UP
	6" Pigtail (Euro-Style) 	**10-30V DC**	**NPN**	RP31-D0300N-CY9P4UE
			PNP	RP31-D0300P-CY9P4UE
 **Diffuse Mode** (Long Range) **Sensing Distance 800mm** **Infrared LED**	**2m Cable** 	**10-30V DC**	**NPN**	~~RP31-D0800N-CY9C3U2~~
			PNP	RP31-D0800P-CY9C3U2
	Quick Disconnect (Pico-Style) 	**10-30V DC**	**NPN**	~~RP31-D0800N-CY9Q4UP~~
			PNP	RP31-D0800P-CY9Q4UP
	6" Pigtail (Pico-Style) 	**10-30V DC**	**NPN**	~~RP31-D0800N-CY9P4UP~~
			PNP	RP31-D0800P-CY9P4UP
	6" Pigtail (Euro-Style) 	**10-30V DC**	**NPN**	~~RP31-D0800N-CY9P4UE~~
			PNP	RP31-D0800P-CY9P4UE

Ap: RP31 SERIES

Polarized Retroreflective Mode / Clear Object Detector

Sensing Mode	Connection	Supply Voltage	Output Mode	Part Number
 **Clear Object Detector** **Sensing Distance 500 mm** (Note) **Infrared Light**	**2m Cable** 	**10-30V DC**	**NPN**	RP31-S0500N-CY6C3U2
			PNP	RP31-S0500P-CY6C3U2
	Quick Disconnect (Pico-Style) 	**10-30V DC**	**NPN**	RP31-S0500N-CY6Q4UP
			PNP	RP31-S0500P-CY6Q4UP
	6" Pigtail (Pico-Style) 	**10-30V DC**	**NPN**	RP31-S0500N-CY6P4UP
			PNP	RP31-S0500P-CY6P4UP
	6" Pigtail (Euro-Style) 	**10-30V DC**	**NPN**	RP31-S0500N-CY6P4UE
			PNP	RP31-S0500P-CY6P4UE
 **Clear Object Detector** **Sensing Distance 50 to 1000mm** (Note) **Infrared Light**	**2m Cable** 	**10-30V DC**	**NPN**	RP31-S1000N-CY9C3U2
			PNP	RP31-S1000P-CY9C3U2
	Quick Disconnect (Pico-Style) 	**10-30V DC**	**NPN**	RP31-S1000N-CY9Q4UP
			PNP	RP31-S1000P-CY9Q4UP
	6" Pigtail (Pico-Style) 	**10-30V DC**	**NPN**	RP31-S1000N-CY9P4UP
			PNP	RP31-S1000P-CY9P4UP
	6" Pigtail (Euro-Style) 	**10-30V DC**	**NPN**	RP31-S1000N-CY9P4UE
			PNP	RP31-S1000P-CY9P4UE

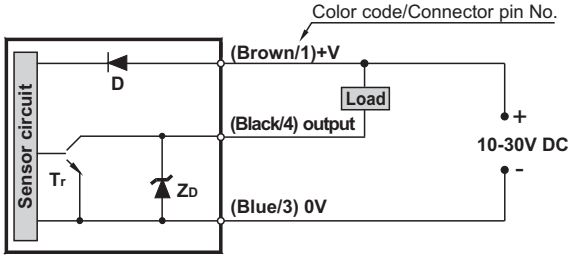
Specifications

Item \ Type		Thru-beam		Retroreflective		Diffuse	
		Standard	Narrow Beam	with polarizing filters	Clear object detector	Long range	Standard
Model No.	NPN output type.	RP31-T010MN.....	RP31-T5000N.....	RP31-L3000N.....	RP31-S1000N.....	RP31-D0800N.....	RP31-D0300N.....
	PNP output type.	RP31-T010MP.....	RP31-T5000P.....	RP31-L3000P.....	RP31-S1000P.....	RP31-D0800P.....	RP31-D0300P.....
Sensing range		**10m**	**5 m**	**0.1 ~ 3m** (Note)	**50mm~1 m** (Note)	**800mm**	**300mm**
Sensing object		ϕ12mm or more opaque object		ϕ50mm or more opaque, translucent or specular object		Opaque, translucent or transparent object	
Hysteresis		———				15% or less of operation distance	
Repeatability		0.5mm or less	0.05mm or less	0.5mm or less		1mm or less	
Supply voltage		10 to 30V DC 10% Ripple P-P 10% or less					
Current consumption		Emitter: 30mA or less Receiver:30mA or less		30mA or less			
Sensing output		**NPN** open-collector transistor Maximum sink current: 100mA Applied voltage: 30V DC or less(between output and 0V) Residual voltage: 1.5V or less (at 100mA sink current)		**PNP** open-collector transistor Maximum sink current: 100mA Applied voltage: 30V DC or less(between output and +V) Residual voltage: 1.5V or less (at 100mA source current)			
	Utilization category	DC-12 or DC-13					
	Output operation	Switchable either Light-ON or Dark-ON					
	Short-circuit protection	Incorporated					
Response time		1 ms or less					
Operation indicator		Red LED (lights up when the sensing output is ON)					
Stability indicator		Green LED (lights up under stable light received condition or stable dark condition)					
Power indicator		Red LED lights up when power is ON		———			
Sensitivity adjuster		Continuously variable adjuster					
Automatic interference prevention function		———		Incorporated (Two units of sensors can be mounted closely)	———	Incorporated (Two units of sensors can be mounted closely)	
Environmental resistance	**Pollution degree**	3 (Industrial environment)					
	Protection	IP 67 (IEC)					
	Ambient temperature	-25 to +55℃ (No dew condensation or icing allowed), storage: -30 to +70℃					
	Ambient humidity	35 to 85 % RH, storage:35 to 85% RH					
	Ambient illuminance	Sunlight: 11000 ℓx at the light receiving face, Incandescent light: 3000 ℓx at the light-receiving face.					
	EMC	IEC 60947-5-2, Parts 7.2.6.1.2.3 or RFI>3V/m(in 30-1000MHZ), EFT>1KV, ESD>4KV(contact)					
	Voltage withstandability	1000 V AC for one min. Between all supply terminals connected together and enclosure.					
	Insulation resistance	20MΩ ,or more, with 250V DC megger between all supply terminals connected together and enclosure					
	Vibration resistance	IEC 60947-5-2, Part 7.4.2 or 10-55HZ, 1.0mm amplitude In X, Y and Z directions for 30 min					
	Shock resistance	IEC 60947-5-2, Part 7.4.1 or 30g,11ms in X,Y and Z directions for six times each					
Emitting element		Infrared LED (modulated)		Red LED (modulated)		Infrared LED (modulated)	
Material		**Enclosure:** Polycarbonate, **Lens:**Polycarbonate, **Indicator Cover:**Polycarbonate, **Front Cover:**Polycarbonate					
Cable		0.2mm² 3-core (thru-beam type emitter: 2-core) oil resistant cabtyre cable, 2m long					
Cable extension		Extension up to total 100m is possible with 0.3mm², or more, cable (thru-beam type: both emitter and receiver)					
Pigtail type		See **Pigtail Series** or our **Cables & Connectors** catalogue.					
Connector type		Pico style (M8) 4pin					
Weight		50g approx.					
Accessories		Adjusting screwdriver : 1pc.		**RE-6152** (Reflector):1 pc. Adjusting screwdriver: 1 pc.		Adjusting screwdriver : 1pc.	

Connection Diagrams

NPN output type

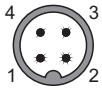
I/O circuit diagram



Symbols...D :Reverse supply polarity protection diode
ZD: Surge absorption zener diode
Tr: NPN output transistor.

Connector pin position

Euro-style



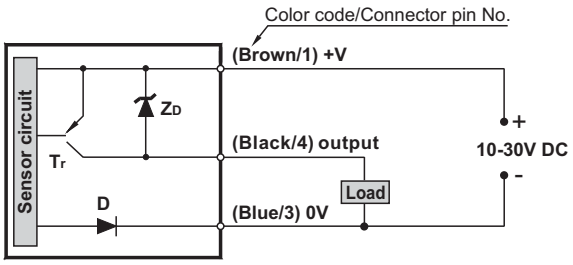
1.Brown (+)
2.Not used
3.Blue (-)
4.Black (Output)

Pico-Style

1.Brown (+)
2.Not used
3.Blue (-)
4.Black (Output)

PNP output type

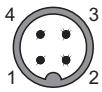
I/O circuit diagram



Symbols...D :Reverse supply polarity protection diode
ZD: Surge absorption zener diode
Tr: PNP output transistor.

Connector pin position

Euro-style



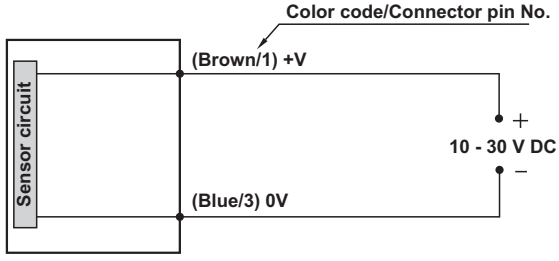
1.Brown (+)
2.Not used
3.Blue (-)
4.Black (Output)

Pico-Style

1.Brown (+)
2.Not used
3.Blue (-)
4.Black (Output)

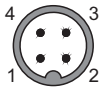
Emitter of Thru-beam Mode

I/O circuit diagram



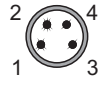
Connector pin position

Euro-style



1.Brown (+)
3.Blue (-)
2.Not used
4.Not used

Pico-Style

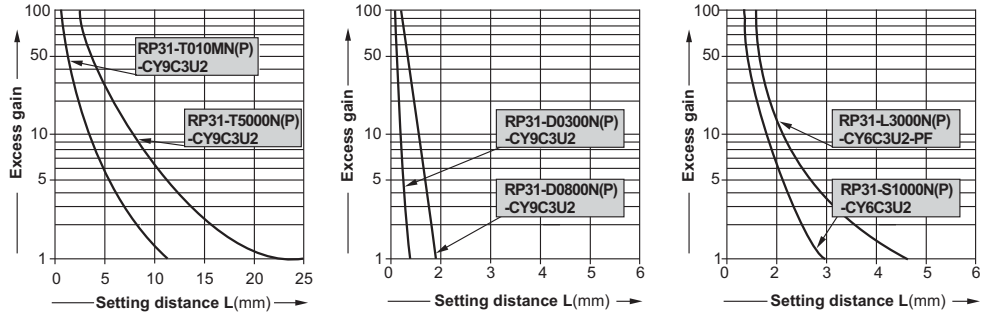


1.Brown (+)
3.Blue (-)
2.Not used
4.Not used

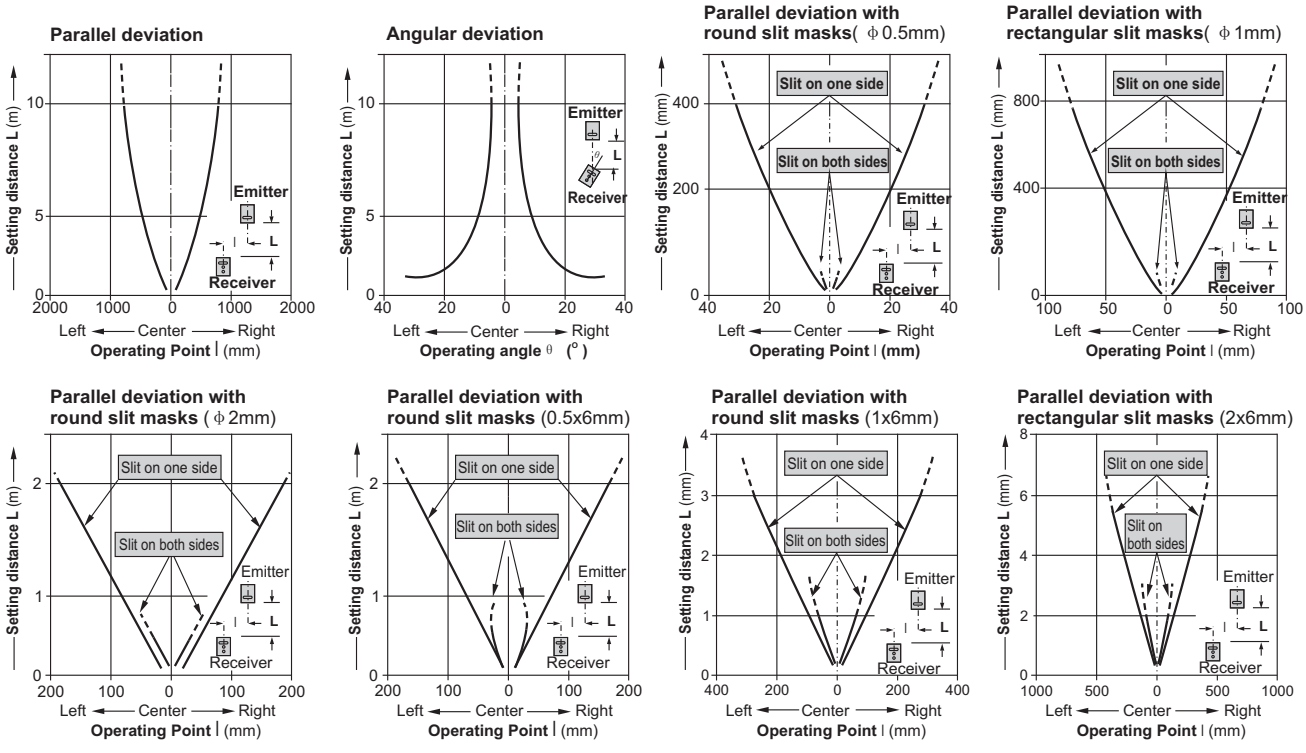
Sensing Characteristics (Typcial)

All Models

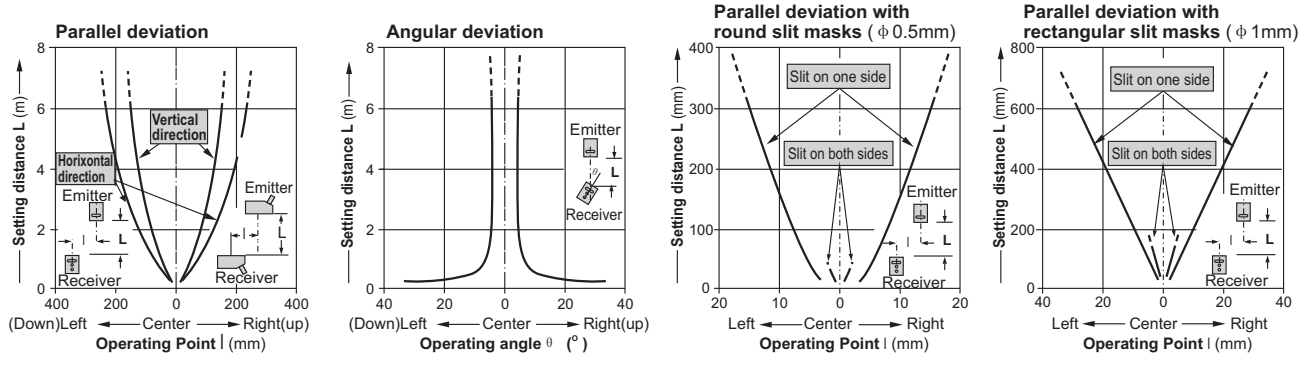
Correlation between setting distance and excess gain



Thru-beam Mode (Sensing Distance=10 m)



Thru-beam Mode (Sensing Distance=5 m)

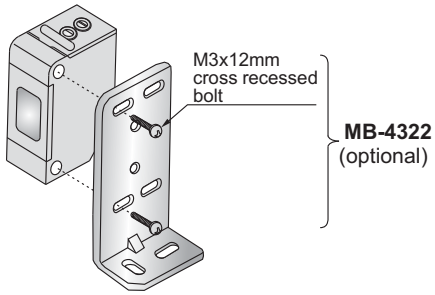


Precautions for Proper Use

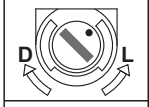
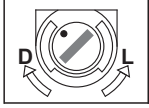
This product is not a safety sensor. Its use is not intended or designed to protect life and prevent body injury or property damage from dangerous parts of machinery. It is a normal object detection sensor.

Mounting

Tightening torque must not exceed 0.5N m {5.1kgf cm}.

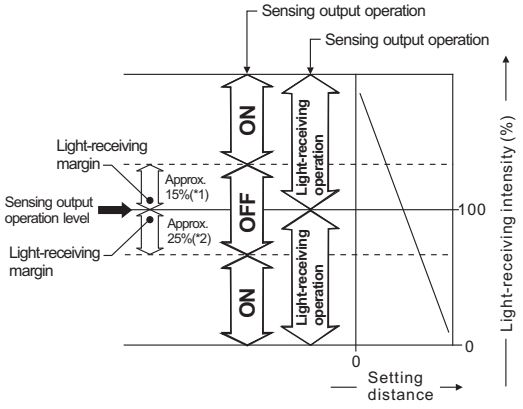


Operation mode selection switch

	**Light-ON** mode is obtained when the switch is turned fully counterclockwise.
	**Dark-ON** mode is obtained when the switch is turned fully clockwise.

Stable operation indicator

The stable operation indicator (green) turns on when the light-receiving intensity of the signal light is sufficient against the operation level .
If the light-receiving level where the stable operation indicator turns on, the sensor can detect stable without affecting the temperature and the voltage change at the Light-ON and the Dark-ON operation.



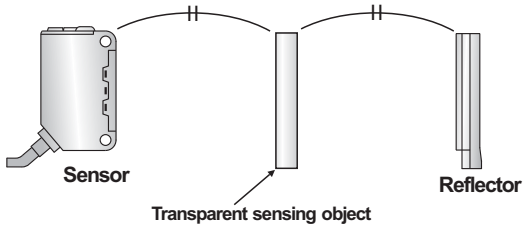
	"Light" state	"Dark" state
Thru-beam	Emitter — Receiver	Emitter — Sensing object — Receiver
Retroreflective, With polarizing filter	Sensor — Reflector	Sensor — Sensing object — Reflector
Retroreflective, Clear object detector	Sensor — Reflector	Sensor — Sensing object — Reflector
Diffuse	Sensor — Sensing object	Sensor

Wiring

Power supply should be turned off before wiring.

Verify voltage fluctuation so that it should not exceed the rated value.
When using a switching regulator for the power supply readily available in the market , always ground the frame ground (F.G.)Terminal.
When using an equipment which generates the noises(switching regulator or inverter motor ,etc.) Near the sensor ,ground the frame ground (F.G.)Terminal of the equipment .Do not run sensor cables high-voltage lines or power lines , nor put them together in the same raceway . Doing so may cause malfunctions due to inductive interference .

Retroreflective type sensor for sensing transparent objects
Optimum sensing is possible when the position of the transparent sensing object is set at the center of the sensor and the reflector. If the sensing position is set near the sensor or the reflector, the sensing may be unstable. In this case, set the sensing position at the center of the sensor and the reflector.



When the sensor detects an uneven plastic receptacle or glass bin, the received light intensity may differ with the sensing position or direction. Adjust the sensitivity after confirming the stable sensing condition by turning the sensing object, etc.
If the object is a transparent cylinder, feed it in a position as shown in Figure A. The sensor may fail to detect an object fed in a position as shown in Figure B.

Right Direction

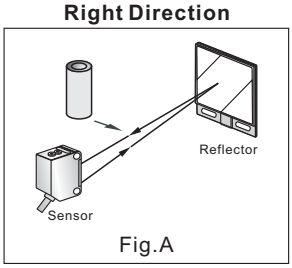


Fig.A

False Direction

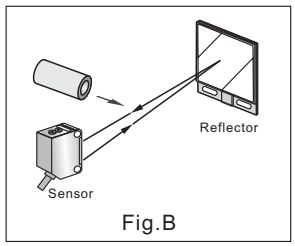
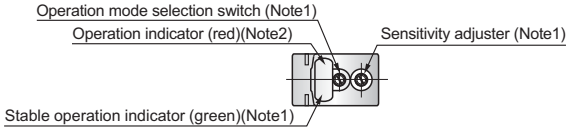
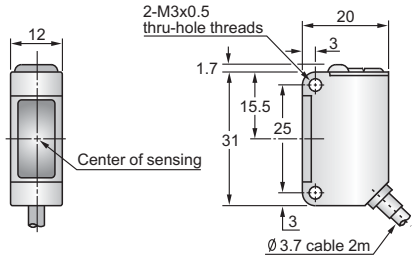


Fig.B

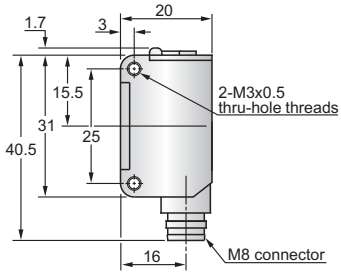
Dimensions (Unit: mm)

Sensor Type



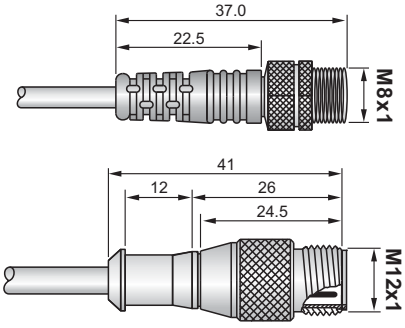


Cable Type



Connector Type

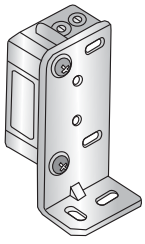
Pigtail* Type



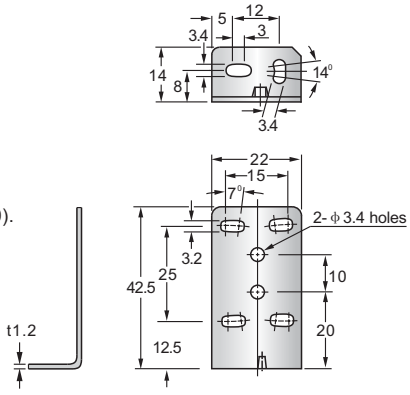
Note:1: Not included with the emitter of the thru-deam sensor.
2: It is the power indicator (red) for the emitter of the thru-deam sensor.

***:** Please see **Pigtail Series** or our **Cables & Connectors** catalogue for more information.

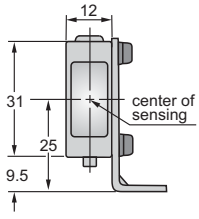
MB-4322 (Sensor mounting bracket-optional)

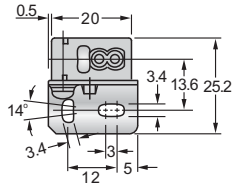


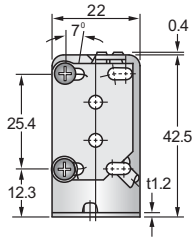
Material: Stainless steel (SUS30).
Two M3 (length 12mm) **screws with washers are attached.**



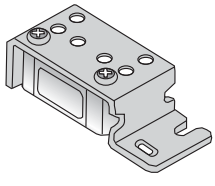
Assembly dimensions



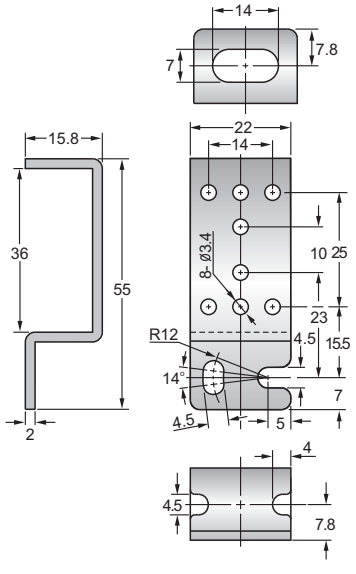




MB-5522 (Sensor mounting bracket-optional)



Material: Stainless steel (SUS304).
Two M3 (length 12mm)
screws with washers are attached.



Assembly dimensions